Claims

[1]   An inter-frame wavelet coding apparatus, comprising:

1. An inter-frame wavelet coding apparatus, comprising:

a Motion Compensated Temporal Filtering (MCTF) unit for computing a motion vectors of a group of pictures (GOP) and filtering the GOP with respect to the temporal axis, to thereby obtain filtered frame;

a wavelet transforming unit for performing spatial wavelet transform on the filtered frame and outputting a wavelet coefficient;

a quantization unit for quantizing the wavelet coefficient;

an entropy coding unit for entropy-coding the motion vector computed in the MCTF unit and the quantized wavelet coefficient, to thereby generate an entropy-coded bit stream; and

a wavelet filter managing unit for selecting a decomposition level and a filter length for the wavelet transforming unit based on motion estimation information of the GOP video computed in the MCTF unit,

wherein the decomposition level and the filter length are included in the entropy-coded bit stream.

[2]   The inter-frame wavelet coding apparatus as recited in claim 1, wherein the MCTF unit performs lowpass filtering and highpass filtering on a lowpass-filtered frame repeatedly, and the wavelet filter managing unit selects a decomposition level and a filter length for the wavelet transforming unit based on the information amount of the filtered frame.

[3]   The inter-frame wavelet coding apparatus as recited in claim 2, wherein the wavelet transforming unit includes:

a first wavelet transformer having a maximum decomposition level and a maximum filter length, for wavelet-transforming a final lowpass-filtered frame; and

a second wavelet transformer having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer, wavelet-transforming the rest highpass-filtered GOP frames.

[4]   The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a 9/7 filter having a three or four-stage decomposition level as the first wavelet transformer.

[5]   The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a 5/3 filter having a three or four-stage decomposition level as the first wavelet transformer.

[6]   The inter-frame wavelet coding apparatus as recited in claim 3, wherein the wavelet filter managing unit selects a Haar filter having one-stage decomposition level as the second wavelet transformer.

[7]   An inter-frame wavelet encoding apparatus, comprising:

an MCTF unit for computing motion vectors of performing a group of pictures (GOP) and lowpass filtering and highpass filtering the GOP with respect to the temporal axis and performing lowpass filtering and highpass filtering on a lowpass-filtered frame repeatedly;

a first wavelet transformer having a maximum decomposition level and a maximum filter length, for wavelet-transforming a final lowpass-filtered frame;

a second wavelet transformer having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer, for wavelet-transforming the rest highpass-filtered GOP frames;

a quantization unit for quantizing wavelet coefficients outputted from the first and second wavelet transformer; and

an entropy coding unit for entropy-coding the motion vector computed in the MCTF unit and the wavelet coefficient quantized in the quantization unit.

[8]   The inter-frame wavelet coding apparatus as recited in claim 7, wherein the first wavelet transformer includes a 9/7 filter having a three or four-stage decomposition level.

[9]   The inter-frame wavelet coding apparatus as recited in claim 8, wherein the first wavelet transformer includes a 5/3 filter having a three or four-stage decomposition level.

[10]   The inter-frame wavelet coding apparatus as recited in claim 8, wherein the second wavelet transformer includes a Haar filter having a one-stage decomposition level.

[11]   An inter-frame wavelet video decoding apparatus, comprising:

an entropy decoding unit for entropy-decoding bit stream including information on a decomposition level and a filter length for inverse wavelet transform;

an inverse quantization unit for inverse quantizing a quantized wavelet coefficient which is outputted from the entropy decoding unit;

an inverse wavelet transforming unit for performing wavelet transform on the wavelet coefficient outputted from the inverse quantization unit based on the decomposition level and the filter length; and

a Motion Compensated Temporal Filtering (MCTF) combining unit for performing MCTF combination on a motion vector of the entropy decoding unit.

[12]   An inter-frame wavelet coding method, comprising the steps of:

a) filtering an inputted group of pictures (GOP) video with respect to the temporal axis, to thereby obtain filtered frames;

b) performing spatial wavelet transform on the filtered frame;

c) quantizing a wavelet coefficient generated during the wavelet transform of the step b);

d) performing entropy-encoding on a motion vector computed in the MCTF process of the step a) and the wavelet coefficient quantized in the quantization process of the step c), to thereby generate an entropy-coded bit stream;

e) selecting a decomposition level and a filter length for the wavelet transform based on motion estimation information of the GOP computed in the MCTF process of the step a); and

f) including information on the decomposition level and the filter length in the entropy-coded bit stream.

[13]   The inter-frame wavelet coding method as recited in claim 12, wherein the step a) includes the step of a1) performing lowpass filtering and highpass filtering on a lowpass-filtered frame repeatedly, and

in the step e) the decomposition level and the filter length are selected based on the information amount of the filtered frame.

[14]   The inter-frame wavelet coding method as recited in claim 13, wherein the step b) includes the steps of:

b1) performing wavelet transform on a final lowpass-filtered frame by using a first wavelet transformer having a maximum decomposition level and a maximum filter length; and

b2) performing wavelet transform on the rest GOP frames by using a second wavelet transformer having a decomposition level and a filter length equal to or smaller than the decomposition level and the filter length of the first wavelet transformer.

[15]   The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a 9/7 filter having a three or four-stage decomposition level is selected as

the first wavelet transformer.

[16]   The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a 5/3 filter having a three or four-stage decomposition level is selected as the first wavelet transformer.

[17]   The inter-frame wavelet coding method as recited in claim 14, wherein in the step e) a Haar filter having a one-stage decomposition level is selected as the second wavelet transformer.

[18]   An inter-frame wavelet decoding method, comprising the steps of:

a) performing entropy-decoding on bit stream including information on a decomposition level and a filter length for inverse wavelet transform;

b) inverse-quantizing a quantized wavelet coefficient generated in the step a);

c) performing inverse wavelet transform on a wavelet coefficient generated in the step b) based on the information on the decomposition level and the filter length; and

d) performing a Motion Compensated Temporal Filtering (MCTF) combination based on a motion vector obtained in the step a).